

**Oberseminar Theoretische Informatik**  
Sommersemester 2009

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**On Bisecting Simple Grid-Graphs**

Fr. 19.06.2009 um 14:00 (c.t.) im Raum 3325 (gegenueber 3319)  
(Ernst-Abbe-Platz 2, 3. Stock).

A grid-graph is a finite induced subgraph of the infinite 4-regular grid. The MIN-GRID-BISECTION-Problem is defined as follows: Given a grid-graph  $G$ , compute a minimum set of edges which cuts  $G$  into two parts containing an equal number of nodes. This problem arises in scientific computing on parallel computers where complex arithmetic calculations have to be performed on grid-like structures and the grid has to be partitioned in such a way that every processor gets the same amount of work and the inter-processor communication is minimized. The MIN-BISECTION-Problem for general graphs is NP-complete but the hardness for planar graphs is still unknown. Grid-graphs are a simple special-case of planar graphs and starting with easy instances we hope to shed some light on the open question regarding planar graphs. This talk will review some results on bisecting grid-graphs without holes and rectangular grids with rectangular holes. We show that MIN-GRID-BISECTION is easy for rectangular grids and rectangular grids with one rectangular hole but as soon as more complex grids come into play the problem becomes NP-complete. The hardness of MIN-PLANAR-BISECTION, however, remains an interesting open problem.

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